Contents

Author Index v
Seminar Committee vii
Reasons for Data Compression—An Introduction. ix
Andrew G. Tescher, The Aerospace Corporation

SESSION I. FUNDAMENTALS OF IMAGE DATA COMPRESSION 1
An Overview of Human Observer Characteristics and their Effect on Image Transmission and Display 2
Thomas G. Stockham, Jr., University of Utah
Coding of Two-Tone Images 5
T. S. Huang, Purdue University
Source Coding of Television Signals Using Interframe Techniques. 9
B. G. Haskell and P. L. Gordon, Bell Telephone Laboratories, Inc.
Bandwidth Compression of Multispectral Data 23
A. Habibi and A. S. Samulon, TRW Systems Group
Real Time Television Image Bandwidth Reduction Using Charge Transfer Devices 36
H. J. Whitehouse, R. W. Means, E. H. Wrench, Naval Undersea Center
Technology of Charge-Coupled Devices for Video Bandwidth Reduction 48
D. D. Buss, R. W. Brodersen, C. R. Hewes, A. F. Tasch, Jr., Texas Instruments, Inc.

SESSION II. ADVANCED IMPLEMENTATIONS 57
Real-Time Video Compression Algorithm for Hadamard Transform Processing 58
Scott C. Knauer, Ames Research Center, NASA
An Advanced Imaging Communication System for Planetary Exploration 70
Robert F. Rice, Jet Propulsion Laboratory
Advanced Facsimile System and Network Applications. 90
John W. Watkins, Harris Corporation, Electronic Systems Division
An Operational Video Data Compression System for ATS and ITOS 94
R. L. Kutz, NASa/Goddard Space Flight Center; L. D. Davisson, Univ. of Southern California
A CAQ Bandwidth Reduction System for RPV Video Transmission 101
James J. Pearson, Lockheed Palo Alto Research Laboratory
Intraframe and Interframe Adaptive Transform Coding. 108
Clifford Reader, Aeronutronic Ford Corporation

SESSION III. Panel: IMPACTS OF IMAGE DATA COMPRESSION 119

SESSION IV. POTENTIAL IMPLEMENTATIONS 121
Joint Pattern Recognition Data Compression Concept for ERTS Multispectral Imaging. 122
Edward E. Hilbert, Jet Propulsion Laboratory
A Dual Mode Nonlinear Interpolative Compressor for SAR Images 138
Wen-hsiung Chen, Aeronutronic Ford Corporation
A Fast Two-Dimensional Karhunen-Loeve Transform. 144
Robert M. Haralick, Norman Griswold, Nimitra Kattiyakulwanich, University of Kansas Center for Research, Inc., Remote Sensing Laboratory
Singular Value Decomposition for Image Coding 160
Harry C. Andrews, University of Southern California, Image Processing Institute
TV Bandwidth Compression 161
Paul Wintz, Purdue University; Jim Wilson, WINTEK Corp.; Ernie Schmidt, Aeronutronic Ford Corp.
DPCM Quantization Error Reduction for Image Coding 167
William K. Pratt, Michael N. Huhns, University of Southern California
Combined Spatial and Temporal Coding of Digital Image Sequences 172
John A. Roese, Naval Undersea Center; Guner S. Robinson, University of Southern California

⇨

SESSION V. RELATED TOPICS 181

Laser Scanner/Recorders for Image Transmission and Computer Processing 182
W. F. Schreiber, U. F. Gronemann, D. E. Troxel, Massachusetts Institute of Technology

Real-Time Image Data Acquisition/Retrieval (RIDAR) System. 190
Harold H. Kantner, CAI, a Division of Bourns, Inc.

An Investigation of MSE Contributions in Transform Image Coding Schemes 196
John R. Parsons, Andrew G. Tescher, The Aerospace Corporation

A Comparison of Hardware Implementations of the Hadamard Transform for Real-Time Image Coding. . . . 207
Stephen C. Noble, Air Force Avionics Laboratory, Wright Patterson Air Force Base

A Teaching Stereo-Video Microscope 212
James F. Butterfield, Dimensional Television Corporation

Pictorial Information Transmission through Simulation 215
Robert T. P. Wang, Honeywell, Marine Systems Division California Center

Three-Dimensional Perception Produced by Two 2-Dimensional Geometric Patterns Presented with Brief Exposure Times and Time Intervals 223
Kiyoe Mizusawa, The Pennsylvania State University

Author Index

Andrews, Harry C. (University of Southern California, Image Processing Institute). 160
Singular Value Decomposition for Image Coding

Brodersen, R. W. (Texas Instruments, Inc.). 48
Technology of Charge-Coupled Devices for Video Bandwidth Reduction

Buss, D. D. (Texas Instruments, Inc.) 48
Technology of Charge-Coupled Devices for Video Bandwidth Reduction

Butterfield, James F. (Dimensional Television Corporation). 212
A Teaching Stereo-Video Microscope

Chen, Wen-hsiung (Aeronutronic Ford Corporation) 138
A Dual Mode Nonlinear Interpolative Compressor for SAR Images

Davisson, L. D. (University of Southern California) 94
An Operational Video Data Compression System for ATS and ITOS

Gordon, P. L. (Bell Telephone Laboratories, Inc.) 9
Source Coding of Television Signals Using Interframe Techniques

Griswold, Norman (University of Kansas Center for Research, Inc.) 144
A Fast Two-Dimensional Karhunen-Loeve Transform

Gronemann, U. F. (Massachusetts Institute of Technology) 182
Laser Scanner/Recorders for Image Transmission and Computer Processing

Habibi, A. (TRW Systems Group). 23
Bandwidth Compression of Multispectral Data

Haralick, Robert M. (University of Kansas Center for Research, Inc.) 144
A Fast Two-Dimensional Karhunen-Loeve Transform

Haskell, B. G. (Bell Telephone Laboratories, Inc.) 9
Source Coding of Television Signals Using Interframe Techniques

Hewes, C. R. (Texas Instruments, Inc.) 48
Technology of Charge-Coupled Devices for Video Bandwidth Reduction

Hilbert. Edward E. (Jet Propulsion Laboratory) 122
Joint Pattern Recognition/Data Compression Concept for ERTS Multispectral Imaging

Huang, T. S. (Purdue University) 5
Coding of Two-Tone Images

Huhns, Michael N. (University of Southern California) 167
DPCM Quantization Error Reduction for Image Coding

Kantner, Harold H. (CAI, a Division of Bourns, Inc.) 190
Real-Time Image Data Acquisition/Retrieval (RIDAR) System

Kattiyakulwanich, Nimitra (University of Kansas Center for Research, Inc.). 144
A Fast Two-Dimensional Karhunen-Loeve Transform

Knauer, Scott C. (Ames Research Center/NASA). 58
Real-Time Video Compression Algorithm for Hadamard Transform Processing

Kutz, R. L. (NASA/Goddard Space Flight Center). 94
An Operational Video Data Compression System for ATS and ITOS

Means, R. W. (Naval Undersea Center). 36
Real Time Television Image Bandwidth Reduction Using Charge Transfer Devices

Mizusawa, Kiyoe (The Pennsylvania State University). 223
Three-Dimensional Perception Produced by Two 2-Dimensional Geometric Patterns Presented with Brief Exposure Times and Time Intervals

Noble, Stephen C. (Air Force Avionics Laboratory, Wright-Patterson Air Force Base). 207
A Comparison of Hardware Implementations of the Hadamard Transform for Real-Time Image Coding

Parsons, John R. (The Aerospace Corporation) 196
An Investigation of MSE Contributions in Transform Image Coding Schemes

Pearson, James J. (Lockheed Palo Alto Research Laboratory) 101
A CAQ Bandwidth Reduction System for RPV Video Transmission

⇒

Pratt, William K. (University of Southern California) 167
DPCM Quantization Error Reduction for Image Coding
Reader, Clifford (Aeronutronic Ford Corporation) 108
Intraframe and Interframe Adaptive Transform Coding
Rice, Robert F. (Jet Propulsion Laboratory) 70
An Advanced Imaging Communication System for Planetary Exploration
Robinson, Guner, S. (University of Southern California) 172
Combined Spatial and Temporal Coding of Digital Image Sequences
Roese, John A. (Naval Undersea Center) 172
Combined Spatial and Temporal Coding of Digital Image Sequences
Samulon, A. S. (TRW Systems Group) 23
Bandwidth Compression of Multispectral Data
Schmidt, Ernie (Aeronutronic Ford Corporation) 161
TV Bandwidth Compression
Schreiber, W. F. (Massachusetts Institute of Technology) 182
Laser Scanner/Recorders for Image Transmission and Computer Processing
Stockham, Jr., Thomas G. (University of Utah) 2
Overview of Human Observer Characteristics & their Effect on Image Transmission & Display
Tasch, Jr., A. F. (Texas Instruments, Inc.) 48
Technology of Charge-Coupled Devices for Video Bandwidth Reduction
Tescher, Andrew G. (The Aerospace Corporation) . . . . . ix, 196
Reasons for Data Compression—An Introduction
An Investigation of MSE Contributions in Transform Image Coding Schemes
Troxel, D. E. (Massachusetts Institute of Technology) 182
Laser Scanner/Recorders for Image Transmission and Computer Processing
Wang, Robert T. P. (Honeywell, Marine Systems Division California Center) 215
Pictorial Information Transmission through Simulation
Watkins, John W. (Harris Corporation, Electronic Systems Division) 90
Advanced Facsimile System and Network Applications
Whitehouse, H. J. (Naval Undersea Center) 36
Real Time Television Image Bandwidth Reduction Using Charge Transfer Devices
Wilson, Jim (WINTEK Corp.) 161
TV Bandwidth Compression
Wintz, Paul (Purdue University) 161
TV Bandwidth Compression
Wrench, E. H. (Naval Undersea Center) 36
Real Time Television Image Bandwidth Reduction Using Charge Transfer Devices